

Total lightning observations within electrified snowfall using polarimetric radar, LMA, and NLDN measurements

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Four electrified snowfall cases are examined using total lightning measurements from lightning mapping arrays (LMAs), and the National Lightning Detection Network (NLDN) from Huntsville, AL and Washington D.C. In each of these events, electrical activity was in conjunction with heavy snowfall rates, sometimes exceeding $5\text{-}8\text{ cm hr}^{-1}$. A combination of LMA, and NLDN data also indicate that many of these flashes initiated from tall communications towers and traveled over large horizontal distances.

During events near Huntsville, AL, the Advanced Radar for Meteorological and Operational Research (ARMOR) C-band polarimetric radar was collecting range height indicators (RHIs) through regions of heavy snowfall. The combination of ARMOR polarimetric radar and VHF LMA observations suggested contiguous layer changes in height between sloping aggregate-dominated layers and horizontally-oriented crystals. These layers may have provided ideal conditions for the development of extensive regions of charge and resultant horizontal propagation of the lightning flashes over large distances.